

Claims

1. A package for at least one glove, comprising:-

an outer hermetically sealed envelope openable under preset conditions; said outer envelope enclosing

an inner envelope comprising a first inner sheet and a second inner sheet in substantial overlying relationship; and

at least one glove disposed between said first inner sheet and said second inner sheet, wherein a cuff portion of said at least one glove is substantially aligned with free edges of said first inner sheet and said second inner sheet; and

suitable grasping means for enabling each of opposed sides of said cuff portion in proximity to said first inner sheet and said second inner sheet, respectively, to be held firmly with respect to said first inner sheet and said second inner sheet, respectively, at least during a part of a preset unpacking procedure of said package.

2. A package as claimed in claim 1, wherein said package comprises two said gloves in juxtaposed arrangement, such that a cuff portion of each said glove is substantially aligned with said free edges of said first inner sheet and said second inner sheet.

3. A package as claimed in claim 1 or claim 2, wherein said first inner sheet is joined to said second inner sheet at the leading edges thereof directly or via a suitable expansion portion.
4. A package as claimed in claim 3, wherein said expansion region comprises a multiplicity of alternating folds of sheet material at or near said leading edges.
5. A package as claimed in any one of claims 1 to 4, wherein said first inner sheet is joined to said second inner sheet at or near the trailing edges thereof directly or via a suitable expansion portion.
6. A package as claimed in claim 5, wherein said expansion region comprises a multiplicity of alternating folds of sheet material at or near said trailing edges.
7. A package as claimed in any one of claims 1 to 6, wherein the said inner envelope further comprises a stub region between said trailing edges and said expansion portion.
8. A package as claimed in any one of claims 1 to 7, wherein said grasping means comprises, for each said glove, at least one first tab joined to said first inner sheet and at least one second tab joined to said second inner sheet at the said longitudinal edges thereof, each said tab comprising projecting portions that project into the said cuff portion of the corresponding said glove.

9. A package as claimed in claim 8, wherein said at least one first tab is integrally formed with said first inner sheet.
10. A package as claimed in claim 8, wherein said at least one first tab is suitably bonded with said first inner sheet.
11. A package as claimed in any one of claims 8 to 10, wherein said at least one second tab is integrally formed with said second inner sheet.
12. A package as claimed in any one of claims 8 to 10, wherein said at least one second tab is suitably bonded with said second inner sheet.
13. A package as claimed in any one of claims 8 to 12, wherein said projecting portions comprise suitable adhesive zones for temporarily holding the gloves in place with respect to the package and the tabs.
14. A package as claimed in claim 13, wherein said adhesive zones comprise a weak adhesive having a bonding strength insufficient to prevent removal of the glove when said glove is grasped by suitable means and moved relative to said inner envelope.
15. A package as claimed in claim 13 or claim 14, wherein said adhesive zones are in the form of strips or spots.
16. A package as claimed in any one of claims 1 to 15, wherein said grasping means are in the form of apertures comprised in said first inner sheet and second inner sheet such as to enable said opposed sides of said cuff portion to be held firmly with respect to said first inner sheet

and said second inner sheet, respectively, when a suitable suction force is applied externally to said first inner sheet and said second inner sheet.

17. A package as claimed in any one of claims 1 to 16, wherein the inner envelope is made from any suitable sheet material including any one of or any combination of paper, cloth and plastic.
18. A package as claimed in any one of claims 1 to 17, wherein said outer envelope comprises a first outer sheet suitably joined to a second outer sheet at the edges thereof.
19. A package as claimed in claim 18, wherein said first outer sheet and said second outer sheet are substantially rectangular, and bonded together along parallel longitudinal edges and along a leading edge and a trailing edge, substantially orthogonal to said longitudinal edges.
20. A package as claimed in claim 19, wherein said leading edges are partially joined together such as provide graspable free ends thereof.
21. A package as claimed in claim 20, wherein at least the bonding along said longitudinal edges and said leading edge may be overcome by a suitable preset force applied to said free ends.
22. A package as claimed in any one of claims 20 to 21, wherein said free edges are folded back for further facilitating grasping thereof.

23. A package as claimed in any one of claims 1 to 22, wherein said outer envelope comprises printed matter thereon.
24. A package as claimed in any one of claims 1 to 23, wherein the outer envelope is made from any suitable sheet material including any one of or any combination of paper, cloth and plastic.
25. A package as claimed in any one of claims 1 to 24, wherein each said glove is provided in substantially flattened condition.
26. A package as claimed in any one of claims 1 to 25, wherein each said glove is provided with at least a portion of the hand portion thereof folded over the remaining portion of the glove.
27. A package as claimed in any one of claims 1 to 26, wherein each said glove is provided with at least a portion of the cuff portion thereof folded backwardly over the same to expose an inner surface of the cuff portion of the glove.
28. A package as claimed in any one of claims 7 to 27, wherein said stub region is joined to the trailing edge of said outer envelope.
29. A glove unpacking apparatus for unpacking the package of claims 1 to 28, comprising:
- separating means for holding said first sheet and said second sheet in said housing, after said outer envelope has been at least partially removed, while said separating said first inner sheet from

said second inner sheet such as to open the said cuff portion of said gloves.

30. Apparatus as claimed in claim 29, wherein said separating means comprise a table and a pad in overlying relationship, and comprising driving means for reciprocally driving at least one of said table and said pad with respect to one another.
31. Apparatus as claimed in claim 30, wherein said pad and said table comprise suction means at mutually facing surfaces thereof.
32. Apparatus as claimed in claim 31, wherein said suction means comprise a plurality of apertures in each one of said mutually facing surfaces, wherein said apertures are in communication with a suitable vacuum source.
33. Apparatus as claimed in any one of claims 29 to 32, further comprising a housing having an inlet opening and an outlet opening.
34. Apparatus as claimed in any one of claims 29 to 33, wherein said inlet opening is substantially aligned with said separating means.
35. Apparatus as claimed in claim 34, wherein at least one of said inlet opening and said outlet opening is closable.
36. Apparatus as claimed in any one of claims 29 to 35, wherein said outlet opening is substantially aligned with said separating means.

37. Apparatus as claimed in any one of claims 29 to 36, further comprising conveying means for conveying a said glove package from said inlet opening to said separating means.
38. Apparatus as claimed in claim 37, wherein said conveying means convey a said packing to a position in-between said pad and said table when said pad and said table are distanced from one another.
39. Apparatus as claimed in any one of claims 29 to 38, further comprising opening means for holding and opening said cuff portion of said cuffs after said first sheet is separated from said second sheet.
40. Apparatus as claimed in claim 39, wherein said opening means comprise, for each glove, a pair of probes adapted for reciprocally moving from a retracted position substantially clear of said outlet opening to a deployed position wherein the ends of said probes are inserted into the said cuff portion of the corresponding glove when said cuff portion has been opened by said separating means.
41. Apparatus as claimed in claim 40, wherein each said pair of probes is adapted for reversibly distancing the probes one from the other such as to hold and stretch said cuff portion.
42. Apparatus as claimed in claim 41, wherein said opening means is further adapted to remove said gloves from said package by returning to said retracted position while holding said gloves.

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43. Apparatus as claimed in any one of claims 40 to 42, wherein said probes are in the form of rods having an external diameter of about 1.5 cm.
44. Apparatus as claimed in any one of claims 41 to 44, wherein for each said pair of probes said probes may be distanced one from another by up to about 16 cm.
45. Apparatus as claimed in any one of claims 39 to 44, further comprising suitable cuff expansion means capable of being reversibly expanded from a first configuration that is sufficiently compact such as to be introduced into said cuff portion, to a second configuration sufficiently expanded such as to abut with respect to and to expand said cuff portion.
46. Apparatus as claimed in claim 45, wherein said cuff expansion means comprises, for each said glove, a suitable inflatable balloon operatively connected to suitable transport means for reversibly transporting said balloon from a retracted position substantially clear of said outlet opening to a deployed position wherein the balloon is inserted into the said cuff portion of the corresponding glove when said cuff portion is held open by said holding means, to an extraction position outside of said outlet opening when said balloon is expanded and held abutted against said cuff portion.
47. Apparatus as claimed in any one of claims 29 to 46, further comprising removing means for at least partially removing the first outer sheet

from the second outer sheet and for introducing said inner envelope into said housing via said inlet opening.

48. Apparatus as claimed in claim 47, wherein said removing means comprises resting means on an outside of said apparatus for substantially aligning a leading edge of said outer envelope with said inlet opening and grasping means for reversibly grasping said leading edge of said outer envelope and for distancing said first outer sheet with respect to said second outer sheet.
49. Apparatus as claimed in claim 48, wherein said grasping means comprise a pair of parallel rollers arranged at said inlet opening and adapted for reversible rotation in close proximity to said apparatus, said rollers further adapted for each engaging the said leading edges of one or the other of said first outer sheet and said lower sheet and for distancing said leading edges one from the other such as to separate at least a part of said first outer sheet with respect to a corresponding part of said second outer sheet.
50. Apparatus as claimed in claim 49, wherein said rollers counter rotate with respect to one another.
51. Apparatus as claimed in claim 49 or claim 50, wherein said rollers are arranged such that as said first outer sheet is being separated from said second outer sheet, said inner envelope is introduced into said inlet opening.

52. Apparatus as claimed in claim 51, wherein said rollers are adapted such as to retain a trailing edge portion of said inner envelope outside of said casing.
53. Apparatus as claimed in claim 52, wherein said rollers are adapted for reversing rotation and extracting the said inner envelope out of said casing after the gloves have been removed from said inner envelope and optionally for removing the outer envelope from said removing means.
54. Glove donning system comprising a housing accommodating:-
- glove unpacking apparatus of any one of claims 29 to 53
- at least one vacuum chamber operatively connected to a vacuum source, said vacuum chamber comprising cuff holding means comprising suction means and at least one suitable contact surface for sealingly holding a cuff portion of a glove in an open condition when said cuff portion is in abutting contact with said at least one surface;
- first transport means for transporting said at least one glove from said unpacking apparatus to said at least one vacuum chamber.
55. Donning system as claimed in claim 54, wherein said at least one vacuum chamber further comprises a second sealable opening for introducing said at least one glove via said first transport means.

56. Donning system as claimed in claim 54 or 55, wherein said first transport means are operatively connected to said holding means and adapted for introducing said at least one glove to said at least one vacuum chamber via said second opening.
57. Donning system as claimed in claim 56, wherein a second transport means is provided for transporting and aligning said cuff expansion means with said at least one glove held in said vacuum chamber via said holding means.
58. Donning system as claimed in claim 57, wherein said second transport means is further adapted for introducing said cuff expansion means into said cuff of said glove and for partially expanding such as to abut and hold said cuff.
59. Donning system as claimed in claim 58, wherein said cuff expansion means comprises a suitable probe in communication with a compressed gas source for injecting compressed gas into said glove after said glove is held by said cuff expansion means.
60. Donning system as claimed in any one of claims 58 or 59, wherein said first transport means is further adapted for removing said holding means from said cuff portion and from said at least one vacuum chamber when the said cuff expansion means is holding said cuff portion.

61. Donning system as claimed in claim 60, wherein said at least one vacuum chamber is adapted for sealingly closing said second opening when said holding means are removed therefrom.
62. Donning system as claimed in claim 60 or claim 61, wherein said cuff expansion means is adapted for expanding the periphery of said cuff portion until said cuff portion is brought into abutting contact with said cuff holding means.
63. Donning system as claimed in claim 62, wherein said at least one vacuum chamber is adapted for actuating said suction means and sealingly holding said cuff portion of a glove in an open condition when said cuff portion is in abutting contact with said at least one surface.
64. Donning system as claimed in claim 63, wherein said at least one vacuum chamber is adapted for providing a vacuum therein when said cuff portion is in sealing abutting contact with said at least one surface.
65. Donning system as claimed in claim 63 or claim 64, wherein said second transport means is adapted to remove said cuff expansion means when said when said cuff portion is in sealing abutting contact with said at least one surface.
66. Donning system as claimed in claim 65, wherein said housing comprises at least one donning opening having a reversibly and selectively openable and sealable door for accessing said vacuum chambers.

67. Donning system as claimed in claim 66, further comprising third transport means for reversibly and selectively transporting said at least one vacuum chamber from a loading position adapted for enabling the said cuff expansion means to expand said cuff portion into abutment with said cuff holding means, to a donning position wherein said at least one vacuum chamber is in sealing contact with said donning opening, such that when said door is opened, access to an inside of said glove is permitted from the outside of said housing.
68. Donning system as claimed in any one of claims 54 to 67, comprising a pair of said vacuum chambers in juxtaposed arrangement.
69. Donning system as claimed in any one of claims 54 to 68, wherein said housing is pressurized to above atmospheric pressure.
70. Donning system as claimed in any one of claims 54 to 69, wherein said housing comprises a suitable air filter.
71. Donning system as claimed in claim 70, wherein said filter is a Hepa 0.2 micron filter.
72. Donning system as claimed in any one of claims 54 to 71, further comprising at least one magazine for storing and selectively dispensing said glove packages to a fourth transport system, wherein said fourth transport system is adapted for transporting each glove package to said removing means.

73. Donning system as claimed in claim 72, wherein said magazine is in the form of a rotatable turntable having a plurality of compartments along the periphery thereof for accommodating said glove packages.

74. Donning system as claimed in claim 73, further comprising a receptacle for storing said packages after said gloves have been removed therefrom.

75. A method for packaging gloves comprising:-

providing an inner envelope having a first inner sheet and a first outer sheet in overlying relationship, said inner envelope comprising suitable grasping means;

temporarily separating said first and second outer sheets and introducing therebetween at least one glove with its cuff portion substantially aligned with parallel overlying edges of said first and second outer sheets;

enclosing said inner envelope within an outer envelope which is subsequently hermetically sealed such as to be openable under preset conditions;

wherein said grasping means are adapted for enabling each of opposed sides of said cuff portion in proximity to said first inner sheet and said second inner sheet, respectively, to be held firmly with respect to said first inner sheet and said second inner sheet, respectively, at least during a part of a preset unpacking procedure of said package.

76. Method for unpacking a glove package comprising at least one glove having a cuff portion and enclosed in an inner envelope having first and second overlying inner sheets and an outer envelope, the method comprising:-

removing said outer envelope;

separating the said first and second inner sheets in a manner such that the cuff portion of the at least one glove is correspondingly separated and opened slightly;

holding and expanding said cuff portion;

removing said glove from said inner envelope.

77. Method of donning gloves from a package accommodating at least one glove, comprising:-

removing said at least one glove from said package according to the method of claim 76;

introducing a suitable cuff expansion means to the open cuff portion of the glove;

expanding the cuff expansion means such as to abut and hold said cuff portion peripherally while removing said glove from said package;

transporting said cuff expansion means holding said glove to a suitable vacuum chamber having suitable cuff holding means;

aligning the cuff portion with said cuff holding means;

expanding said cuff expansion means such that said cuff portion is in abutting contact with said cuff holding means;

actuating said holding means so as to hold the opened cuff portion in an expanded open position at said cuff holding means;

providing a vacuum at said vacuum chamber on the outer surface of said glove such as to expand the glove under the influence of atmospheric pressure acting on the inner exposed part of the glove;

allowing access of a user's hand to said cylinder for donning the glove therein;

terminating the said vacuum in said cylinder.

78. Glove package substantially as described herein with reference to the attached drawings.

79. Unpacking apparatus substantially as described herein with reference to the attached drawings.

80. Donning system substantially as described herein with reference to the attached drawings.

81. Method for packing gloves substantially as described herein with reference to the attached drawings.

82. Method for unpacking gloves substantially as described herein with reference to the attached drawings.

83. Method for donning gloves substantially as described herein with reference to the attached drawings.